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Applicant(s): LG Electronics Inc.

COMMISSIONER

[ABSTRACT OF DISCLOSURE]

[ABSRTACT]

The present invention relates to a method for managing multiple reproduction path data stream of a high-density optical disc and a high-density optical disc according to the same. A method for managing multiple reproduction path data stream of a high-density optical disc in accordance with the present invention is characterized in that multiple reproduction path data stream recorded in a high-density optical disc such as a BD-ROM is classified into different clip files according to characteristic of each path data and the multiple reproduction path data stream is interleaved by the unit of a clip file according to relation between the clip files so as to be recorded in a high-density optical disc. Thus, the user can selectively play a data stream of a desired reproduction path and any buffer underflow is effectively prevented from occurring during a jumping operation while a buffer size is prevented from becoming excessively large.

[REPRESENTATIVE DRAWING/ TYPICAL DRAWINGS]

FIG. 3

[INDEX WORDS]

Multiple reproduction path data stream, BD-ROM, clip file, file interleaving, clip file maximum size

[SPECIFICATION]

[TITLE OF THE INVENTION]

METHOD FOR MANAGING MULTIPLE REPRODUCTION PATH DATA STREAM OF HIGH-DENSITY OPTICAL DISC AND HIGH-DENSITY OPTICAL DISC ACCORDING TO THE SAME

[BRIEF DESCRIPTION OF THE DRAWINGS]

FIG. 1 is a diagram illustrating the file structure of an optical disc rewritable (BD-RE).

FIG. 2 is a diagram illustrating the connections between the PLAYLIST file, clip file, and clip information file.

FIG. 3 is a diagram illustrating an embodiment in which multiple reproduction path data stream is interleaved and recorded by the unit of a clip file in a method for managing multiple reproduction path data stream according to the invention.

FIG. 4 is a diagram illustrating an optical disc reproducing apparatus to which a method for managing multiple reproduction path data stream according to the invention is applicable.

FIG. 5 is a diagram illustrating another embodiment in which multiple reproduction path data stream is interleaved and recorded by the unit of a clip file in a method for managing multiple reproduction path data stream according to the invention.

Description of main part in drawings

10 : optical disc   11: optical pickup

12: VDP system   13: D/A converter

[DETAILED DESCRIPTION OF THE INVENTION]

[OBJECT OF THE INVENTION]

[FIELD OF THE INVENTION AND BACKGOUND OF THE RELATED ART]

The present invention relates to a method for managing multiple reproduction path data stream of a high-density optical disc, which is employed to manage recording and reproduction of multiple reproduction path data stream in/from a high-density optical disc such as a high-density read only optical disc, and a high-density optical disc according to the same.

The standardization of new high-density rewritable optical disks capable of recording large amounts of high-quality video and audio data, for example, a blu-ray disc rewritable (BD-RE) has been progressing rapidly and new optical disk related products are expected to be commercially available on the market in the near future.

The file structure of the BD-RE, as shown in FIG. 1, includes an uppermost root directory that contains at least one DVR directory. The DVR directory includes files such as 'infor.dvr', 'menu.tidx', and 'mark.tidx', a PLAYLIST directory in which playlist files (*.rpls, *.vpls) are stored, a CLIPINF directory in which clip information files

(*.clpi) are stored, and a STREAM directory in which MPEG2-
formatted A/V stream clip files (*.m2ts) corresponding to
the clip information files are stored.

Various reproduction control information associated
with '01001.m2ts' and '02000m2ts' which are examples of the
clop files stored in the STREAM directory may be recorded
in '01000.clpi' and '02000.clpi' which are stored in the
CLIP directory, respectively. Playlist information, which
is used for reproducing '01001.m2ts' and '02000m2ts'
continuously and determining the order of reproduction of
'01001.m2ts' and '02000m2ts', may be recorded in
'01001.rpls' which is stored in the PLAYLIST directory.

As shown in FIG. 2, the recording and reproduction of
A/V stream (e.g., clip A/V stream recorded by the unit of a
clip sequentially in chronological order) in/from the BD-RE
are managed by real playlists of the BD-RE, virtual
playlists set up by user's editing, and a clip information
file.

Thus, an optical disc reproducing apparatus which
detects and reproduces the A/V stream recorded in the BD-RE
performs a series of operations for reproducing the clip
A/V stream which is managed by the associated real
playlists, virtual playlists, and clip information file.

The standardization for high-density read only
optical disks such as the Blu-ray ROM (BD-ROM) is still

under way. An effective method for managing the recording and reproduction of multiple reproduction path data stream such as multi-story, multi-parental, and multi-angle data streams to be recorded in a particular recording area within the BD-ROM is not yet available. Hence, there is need to provide an effective method for managing recording and reproduction of multiple reproduction path data stream urgently.

[TECHNICAL SOLUTION OF THE INVNETION]

Accordingly, the present invention has been made in view of the above problems. An object of the present invention is to provide a method for managing multiple reproduction path data stream of a high-density optical disc and a high-density optical disc according to the same, in which the multiple reproduction path data stream recorded in a high-density optical disc such as a BD-ROM is classified into different clip files according to characteristic of each path data and the clip files are recorded or reproduced physically adjacently to related clip files.

[SYSTEM AND OPERATION OF THE INVENTION]

To achieve the aforesaid object and in accordance with the present invention, a method for managing multiple reproduction path data stream of a high-density optical disc is characterized in that multiple reproduction path

data stream recorded in a high-density optical disc such as a BD-ROM is classified into different clip files according to characteristic of each path data and the multiple reproduction path data stream is interleaved by the unit of a clip file according to relation between the clip files so as to be recorded in a high-density optical disc.

Hereinafter, preferred embodiments of the present invention, which provides a method for managing multiple reproduction path data stream of a high-density optical disc and a high-density optical disc according to the same, will be described in detail referring to the accompanying drawings.

FIG. 3 illustrates an embodiment in which the multiple reproduction path data stream is interleaved by the unit of a clip file in a method for managing multiple reproduction path data stream according to the present invention. For example, the multiple reproduction path data stream such as multi-story data stream, multi-parental data stream, multi-angle data stream, and the like recorded in the BD-ROM is classified into a plurality of clip files different from one another based on the characteristic of each path data.

For instance, if an original data stream to be recorded on the BD-ROM has an order of a common path data portion, a first reproduction path data portion, another

common path data portion, and a second reproduction path data portion, the first common path data portion is managed as a first clip file Clip File #1 and the first reproduction path data portion is managed as a second clip file Clip File #2.

In addition, the second common path data portion is managed as a third clip file Clip File #3 and the second reproduction path data portion is managed as a fourth clip file Clip File #4. The first through fourth clip files Clip File #1, Clip File #2, Clip File #3, and Clip File #4 are recorded in a physically interleaved fashion on the BD-ROM.

For instance, the physical recording may be successively carried out in the order of the first common path data portion of the first clip file, the first reproduction path data stream of the second clip file, the second reproduction path data portion of the fourth clip file, and the second common path data portion of the third clip file.

Accordingly, the first reproduction path data portion of the second clip file and the second reproduction path data portion of the fourth clip file are recorded in an interleaved state between the first common path data portion of the first clip file and the second common path data portion of the third clip file.

When a reproduction operation for the data of the second reproduction path is designated at the request of the user using an optical disc reproducing apparatus, the optical disc reproducing apparatus reads out and reproduces the first common path data portion of the first clip file, and then carries out a jumping operation to the second reproduction path data portion of the fourth clip file, as shown in FIG. 3. Here, the optical disc reproducing apparatus may include, as shown in FIG. 4, an optical pickup 11, a video disc play (VDP) system 12, and a D/A converter 13.

Thereafter, the optical disc reproducing apparatus carries out a reproduction operation for the second reproduction path by reading out and reproducing the second common path data portion of the third clip file.

Accordingly, the user can selectively play a data stream of a desired reproduction path. The length of each clip file should be appropriately set so as to prevent any buffer underflow from occurring during a jumping operation from one clip file to another clip file while preventing the buffer size from becoming excessively large.

For example, in the case of an excessively short clip file length, a buffer underflow of the reproducing apparatus may occur during a big jump operation.

Furthermore, there is a drawback in that it is necessary to manage a relatively large number of clip files.

On the other hand, in the case of an excessively long clip file length, a buffer should have a large size adapted to temporarily store a read data stream. For this reason, the length of each clip file is set, taking into consideration buffer underflow, buffer size, and efficiencies of recording and managing the clip file.

In another embodiment of the present invention, the size of a clip file is limited to a maximum file size Clip File Max Size while the multiple reproduction data stream is classified into different clip files according to the characteristic of each path data.

For instance, as shown in FIG. 5, an original data stream to be recorded on the BD-ROM is classified into first through fifth clip files referring to the preset maximum file size, by which, as described above, the buffer underflow is prevented from occurring during a jumping operation from one clip file to another clip file and the buffer size is prevented from becoming excessively large.

The preferred embodiments of the invention described above have been given for exemplary purpose only. The present invention is applicable to optical discs other than the BD-ROM, for example, a blu-ray disc rewritable (BD-RE). It will be apparent to those skilled in the art that

various modifications and variations can be made within the scope and spirit of the present invention disclosed in the appended claims.

[EFFECT OF THE INVENTION]

In the above-described method for managing the multiple reproduction path data stream of a high-density optical disc and a high-density optical disc according to the same in accordance with the present invention, the multiple reproduction path data stream is classified into different clip files based on the characteristic of each path data to be recorded in a high-density optical disc such as a BD-ROM and the clip files are recorded such that the clip files are physically adjacent to related clip files, thereby allowing the user to selectively play a data stream of a desired reproduction path and preventing any buffer underflow from occurring during a jumping operation while preventing the buffer size from becoming excessively large.

What is claimed is:

1. A method for managing multiple reproduction path data stream of a high-density optical disc which is characterized in that

multiple reproduction path data stream recorded in a high-density optical disc is classified into different clip files according to characteristic of each path data and

the multiple reproduction path data stream is interleaved by the unit of a clip file according to relation between the clip files before being recorded in a high-density optical disc.

2. A method for managing multiple reproduction path data stream of a high-density optical disc as claimed in claim 1, wherein the multiple reproduction path data stream is any one of multi-story, multi-parental, and multi-angle data streams.

3. A method for managing multiple reproduction path data stream of a high-density optical disc as claimed in claim 1, wherein clip files, from among the different clip files, to be selectively reproduced in response to user's selection of reproduction path are recorded while being physically adjacent to one another.

4. A method for managing multiple reproduction path data stream of a high-density optical disc as claimed in claim 1, wherein a maximum size of the clip files is adequately determined, considering at least one of buffer underflow which may occur during a jumping operation and a buffer size.

5. A high-density optical disc according to a method for managing multiple reproduction path data stream of a high-density optical disc as claimed in claim 1 or 4, wherein the multiple reproduction path data stream is interleaved by the unit of a clip file for each reproduction path so that clip files associated with one another are recorded while being physically adjacent to one another.